

# Conceptual design of a carbon neutral kindergarten in Trondheim

An interdisciplinary student design competition at NTNU and Chalmers

The competition is carried out within the courses:

- AAR4610. "Energy and Resource Efficient Architectural Design" at NTNU, Faculty of Architecture and Fine Art
- TEP4245. "Climate Engineering" at NTNU, Faculty of Engineering Science and Technology
- AUT101 "Resource Efficient Building for the Future" at Chalmers, Architecture A4, Design Studio in the Master Programme "Architecture – Sustainable Development"

The jury consisted of 4 practising professionals (2 architects & 2 engineers):

- Espen Dahl, GASA Architects, Oslo, Norway
- Gunilla Murnieks, Wingårdh Architects, Göteborg, Sweden
- Ida Bryn, Erichsen & Horgen Engineers, Oslo, Norway
- Maria Olsson, WSP Miljö, Göteborg, Sweden

The jury's verdict:

## General remarks

The jury wishes to refer to some general issues that are common for most of the entries in the competition.

The first focus point of the competition, the concept's ability to integrate environmental issues in architecture, concerns, naturally, basic architectural qualities such as use, usefulness and the organisation of space. The usefulness also includes flexibility and generality and, not least, efficient use of area and volume. To every square meter there is a connection to a certain amount of energy and material. The more effective use of the space, the less is the demand for energy and resources. Very few entries have given information about the area of the buildings or the distribution of areas within the buildings. Such information is valuable to any client in every project, especially when comparisons shall be made.

The second topic, adaptation the local climate and site, concerns the context. The site is situated in a so far un-built area. It is more or less flat and exposed to wind. The local climate is, therefore, a more dominant constraint than urban issues. In general, the entries have focused a little bit too much on the building and, for example, not paid enough attention to landscaping and the possibilities to create wind protection, spaces or places using vegetation.

The third topic, zoning of functions according to usability and indoor climate, is closely connected to the first topic. Concerning usability and zoning, the entrance and how to find it is an important detail in a kindergarten. There is no given demand as to whether a project should have one, two or more entrances, but their location in relation to the street and to each other decides in many ways the small but appreciated qualities in the daily life for parents and children. The jury observes that most projects have located the entrances to the "inside" of the site, which in some cases have lead to reduced flexibility and unclear internal communications. Entrances on the "outside" could in these projects caused less problems and given two advantages: i) The zone within the buildings towards the playground had become more flexible and ii) the internal circulation would have been less complicated.

Access to the roofs is practiced in some projects. Such a measure needs railings for safety reasons that have not been paid enough attention to. On this site, with generous space for outdoor activities the concept seems to be a little bit unnecessary, and has not really added any qualities to the projects. Using roofs as gardens or playgrounds is more motivated in dense urban areas.

Some projects work with differentiated climate zones, so to speak "boxes inside boxes". This concept can easily be destroyed if the activities are not thoroughly analysed. If the activities cause much opening of doors the effect of the closed box and differentiation of temperature zones will be lost. Toilets, for example, should not be placed outside a warm, inner zone, since children have to go to the toilets frequently all the year round.

The Norwegian are mainly using hybrid ventilation systems. The jury wants to remark that heat exchange is more difficult to manage in hybrid systems. Systems with low pressure will also make it difficult to obtain heat exchange. It is not mentioned in the programme, but the design of the technical systems must take the maintenance aspect in regard. The more complicated systems, the more skills are needed from someone who has the responsibility to run it. Systems must be very simple to understand and manage; otherwise there is a great risk that the energy and climate performance never will reach the calculated target values.

Finally, some presentations lack elementary architectural information. There are no gauges. Such tools for measurements are especially necessary in presentations based on reduced pdf documents. Entrances are not always marked on the site plan. Facades and plans are in some projects not compatible in scale or even contents. The graphics do not always give more information; on the contrary the projects have been more difficult to interpret.

### **1<sup>st</sup> Norwegian Prize Winner: Flex it : Play it**

*Group members: (ARCH) Ane Elise Alsgaard, Tore Hillestad & Andreas Brock; (ENG) Inger H. Halvorsen*

The project has one entrance to the west. The analyses of climate and how to use vegetation are informative and relevant, and lead to a nice landscaping. The access is clear both concerning the entrance to the west and the two facing southwards. The plan is flexible and gives rooms for general use. The daylight distribution is cleverly integrated in the concept and gives extra qualities. The moving boxes are part of the space efficiency thinking, even if they need to be handled with care and regarding the safety for children. There is an accurate description of the use of materials. The energy balance seems to be optimistic; otherwise the system is properly designed. The roof needs to be studied in detail about snow and rainwater. The strength in the project is that it is consistent in plan, cross section and facades. The presentation is very clear, and the winter perspective gives a true feeling of Trondheim in the winter.

The jury has decided to award "Flex i play it" with a second prize of 15 000 NOK: For a consistent and thoroughly carried out project that fulfils all topics in the given programme. The project integrates environmental issues into an architectural concept, is well adapted to the site and local climate conditions and has an elegant plan that provides both identity and flexibility.

### **2<sup>nd</sup> Norwegian Prize Winner: Evergreen**

*Group members: (ARCH) Agnete Syrtveit, Fredrikke Finne Seip & Geir Magne Lied; (ENG) Ole Aksel Sivertsen & Anne Kristine Amble*

The concept is a warm building within a cold one, a greenhouse. The solution gives some advantages, such as a rain and wind protected area with outdoor feeling in the winter. It can also protect from rain and moisture during the building phase and the simple volume is favourable from a maintenance point of view. The landscape design shows trees and bushes that could provide wind protection. The toilets should be integrated in the warm zone, otherwise the zoning concept will be ruined. The plan is robust and provides sufficient flexibility. The sun shading ought to be placed in the outer shell and not on the inner volume. The use of thermal mass and night insulation are well thought out measures. The technical system is well described, even if the energy calculations seem to be too optimistic. The description also contains interesting and relevant thoughts about materials. The strength of the project is its clear and rational approach to both architectural and technical matters. The presentation is informative.

The jury has decided to award "Evergreen" with a fourth prize of 10 000 NOK: For a clever fulfilment of a concept based on a building with two climate zones. The topics in the competition programme can be fulfilled after small alterations in the building and the technical investigations.

### 3<sup>rd</sup> Norwegian Prize Winner: Cloverfield

*Group members: (ARCH) Håkon Hasslan, Hanne Helgesen & Kjersti Moen Fagerheim; (ENG) Sofi Bäcklund & Silje Eik Kalve*

The concept is compact and gives an efficient use of areas. The distribution of functions also gives flexibility and generous spaces for different uses. The building is placed in the middle of the site, which can give a differentiation of outdoor areas, a possibility that is not shown yet. The wind protection is not taken in regard. Despite the compact volume the daylight distribution is solved. Vertical skylights give less technical problems than horizontal. The technical report contains many calculations but not so much credible information about the energy balance. The solar collectors are said to have an angle of 65° but that angle can't be found on the drawings. The strength of the concept is that the problems connected to a compact building are solved and that the advantages have been used. The presentation is informative and clear.

The jury has decided to award "Cloverfield" with a sixth prize of 5 000 NOK: For a demonstration that a compact building can give architectural and spatial qualities in a kindergarten. The project is well adapted to the site and local climate and, gives a high degree of usefulness but lacks a balance between architectural and technical qualities.

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